

Formulation and Evaluation of Herbal Digestive Churna

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ABSTRACT

The formulation and evaluation of herbal churna explores the natural herbal mixture to improve digestion and reduce digestive issues like bloating and indigestion. These mixture combines ginger, cardamom, coriander, Fenugreek seeds, black pepper, fennel, ajwain all known to their digestive benefits. Our tests show that this herbal mixture can be promising solution for managing common digestive issues with minimal side effects. The formulation process involves the careful selection of the ingredients according to their digestive properties and palatability. Each component was chosen based on its historical usage in the traditional medicine. The powder were mixed in appropriate techniques according to their uniform distribution and maximum therapeutic efficacy. The evaluation process were done by comparing the various parameters including physicochemical parameters, digestive efficacy and sensory attributes. The physicochemical properties include particle size distribution, mixture content, bulk density and flow properties to maintain products quality and stability. Sensory attributes involve the detection of colour, odour, taste and overall acceptability to increase consumer preference and market viability. For determination of efficacy of the digestive churna there are two main process carried out that is in vivo and in vitro studies. In vitro assay stimulate the gastrointestinal conditions to investigate the powders enzymatic activity, PH, and interaction with digestive enzymes. In Vivo study involve the administration of powder to human subjects and detecting the parameters such as digestion time, gastrointestinal discomfort and short characteristics. The preliminary studies shows that the herbal digestive churna passes the physicochemical properties and digestive efficacy.

INTRODUCTION

The digestive disorders have become a critical global health issues, which affects million of people worldwide. The rate of gastrointestinal problem such as bloating, indigestion and irritable bowel syndrome (IBS) has led to an increased reliance on pharmaceutical medication, however this synthetic drug often come with adverse effects particularly with the prolonged use. In contrast, traditional remedies to promote digestive health, leveraging the therapeutic properties of plants to alleviate gastrointestinal discomfort. This study explores the formulation and evaluation of herbal digestive churna, combining natural ingredients with known digestive benefits to create the potentially effective and side effects free solution for managing the digestive issues.

The formulation and evaluation of herbal digestive powder represents a one step towards bridging the gap between traditional and Modern science. By producing the synergistic effects of multiple botanical this study mainly aims developed the solution for digestive health that rooted in the both tradition and evidence based medicine.

Objectives-

The primary objective of herbal churna are to ensure its safety, efficacy and quality by standardizing the formulation process, verifying it's chemical composition and assessing it's therapeutic properties.

This involves verifying that the ingredients are authentic, testing for contaminants like heavy metals and microbes and ensuring the consistency in the final product.

1) Standardization

For ensuring the uniformity between batches the consistent and reproducible formulation were established.

2) Quality control

To ensure the churn meets specific standards for purity, safety and efficacy there is need to implement quality control parameters.

3) Dosage optimization

Determine the appropriate dosage of each ingredient to achieve the desired therapeutic effect.

4) Authentication

Verifying the identity and origin of plant materials used in the formulation.

5) Purity and safety

Determine the presence of contaminants heavy metals and microbes in churna.

6) Chemical characterization

Identifying and quantifying the key chemical components of churna to understand its active principles.

7) Therapeutic efficacy

Determine the ability of churna to complete targeted health conditions often through in vitro and in vivo studies.

8) Comparative analysis

Comparing the formulated churna with the marketed products to assess its performance and benefits.

Ingredients-

Ginger–



(Fig.1 Ginger)

- Synonyms –Adrak, shunthi , singabera, aale
- Kingdom – Plantar
- Family- Gingeraceae
- Biological name- Zingiberofficinale
- Uses-
 - Ginger powder is widely used for its digestive preparation.
 - Stimulate digestive enzymes.
 - Improve gastric motility.
 - Treat nausea, bloating and flatulence.
 - Use in culinary dishes.
 - Used in beverages to enhance digestive health and flavours.
- side effects –
 - Gastrointestinal discomfort.
 - Allergic reaction
 - Stomach upset.

Cardamom



(Fig 2 – cardamom)

- Synonyms –Elaichi, eletraria
- Kingdom – Plantae
- Family –Gingiberaceae
- Biological name- Elettariacardamum
- Uses-

-Secretion of digestive enzymes.
- promote intestinal motility.
- Relieve symptoms of indigestion, bloating, gas and cramps.
- Added in culinary dishes .
- Enhance digestion and impart delightful aroma and flavor.

Side effects –

- 1) Gastrointestinal discomfort –
It mainly includes diarrhoea and abdominal pain , heartburn and nausea , vomiting on excessive consumption of the cardamom.
- 2) Allergic reactions –
Due to excessive consumption of cardamom the skin rashes, itching, breathing difficulties and anaphylaxis can be leads .
- 3) Interactions with medications –
Cardamom may interact with blood thinners, increase the risk of bleeding.
- 4) Other considerations –
Cardamom may stimulate uterine contraction.
And liver medication.

Coriander



(Fig.3 – coriander)

- Synonyms – Dhaniya , cilantro , chinese parsley.
- Family – Apiaceae (umbeliferae)
- Biological name- coriandrum sativum
- Uses-
 - It is rich Content of essential oil, antioxidant and dietary fibers .
 - Stimulate digestive enzymes.
 - Promote secretion of gastric juice.
 - Reduce symptoms of indigestion, bloating and gas.
 - Used as culinary dishes or fused into herbal teas and decoration to support digestive health.

• Side effects –

Coriander powder is generally safe for consumption but excessive consumption may leads to various side effects.

- 1) Allergic reaction –
Usually all the Apiaceae family contents may leads to hypersensitivity reaction. It includes skin rash, itching or redness.
- 2) Gastrointestinal discomfort –
It leads to symptoms such as stomach upset, nausea, diarrhoea etc.
- 3) Interactions with medications –
This powder interacts with certain medications such as blood thinner or medication for diabetes.

4) Black pepper –



(Fig.4- Black pepper)

- Synonyms –Piper nigrum , miri
- Kingdom –Plantae
- Family – Piperaceae
- Biological name –Piper nigrum
- Uses-
 - Food seasoning .
 - Treat fever and mucus congestion.
 - slow or stagnant circulation.
 - as laxative.
 - To treat arthritis.
 - Increase bioavailability of other herbs .
- Side effects –
 - Heartburn
 - Burning sensation in mouth or throat.
 - Large amount of black pepper causes miscarriage
 - Burning in eyes.

5) Fennel



(Fig.5- Fennel)

- Synonyms – Fructusfoeniculli, fenkel, sweet fennel
- Kingdom – Plantae
- Family – Umbeliferae
- Biological name – Foeniculumvulgare
- Uses-
 - It is good source of fibers.
 - To treat digestion, bloating and gas.
 - used as spices.
 - Used as post meal palate cleanser.
 - To treat constipation
 - carminatives.
 - antioxidant, antiseptic.
 - promote hair growth and prevent hair loss.
- Side effects –
 - Allergic reactions.
 - Hormone imbalance

- Increase sensitivity to sunlight.

6) **Ajwain –**



(Fig.6- Ajwain)

- Synonyms – Bishop’s weed
- Kingdom – Plantae
- Family – Umbeliferae
- Biological name- *Trachyspermum ammi*.
- Uses-
 - Antispasmodic
 - Stimulants
 - Carminatives
 - To treat sore throat and bronchitis.
 - Ajwain oil is used as antiseptic, antifungal, insecticide.
 - Used as deodorant in mouth wash and tooth paste.
 - Used as flavouring agents.
- Side effects-
 - Peptic ulcer
 - Acidity or reflux.
 - Dizziness.

7) Cumin –



(Fig.7 – cumin)

- Synonyms – jeeraka , cuminumcyminum
 - Kingdom – Plantae .
 - Biological name- CuminumCyminum
 - Family- Apiaceae.
 - Uses-
Many uses including spices , traditional medicine and potential health aid.
- 1) Use as spice-
 - Flavouring components in soups, breads , pickles etc.
 - In Indian curries, chutney and spice mixes.
 - 2) Use as traditional medicine –
 - To treat indigestion, diarrhoea, jaundice, flatulence and colic.
 - Use to increase urination and relieve bloating.
 - Used to start menstruation and increase sexual desire.
 - Used as carminatives, antispasmodic, astringent, antiepileptic and diuretic effect.
 - 3) Potential health benefits –
 - It helps to weight loss.
 - Improve blood sugar level.
 - Help to handle stress.
 - It helps to relieve from asthma.

- It helps to smoothen skin and treat acne.
- Side effects –
On the excessive consumption of cumin the following side effects were observed.
 - Stomach upset
 - Allergic reactions.
 - Heartburn
 -

8) Fenugreek seeds-



(Fig .8 – Fenugreek seeds)

- Synonyms –methi, trigonella, Greek hay
- Kingdom – Plantae
- Family – Fabaceae (leguminose)
- Biological name- Trigonellafoenum- graceum side
- Uses-
 - It contains high fibre content.
 - It is mucilaginous compound
 - It contains various bioactive constituents.
 - It promotes production of digestive enzymes.
- side effects –

- Gastrointestinal discomfort.
- Hypoglycemia .
- Hypersensitivity reaction.

Ingredients table –

The following ingredients table is for 50 gm herbal digestive powder.

Sr.no	Ingredients name (powder)	Quantity taken
1	Ginger powder	6 gm
2	Cardamom powder	6 gm
3	Coriander powder	8 gm
4	Black pepper powder	4 gm
5	Fennel powder	8 gm
6	Ajwain powder	6 gm
7	Cumin powder	7 gm
8	Fenugreek powder	5 gm

METHODOLOGY

- 1) Collection of raw material
 - Collect High quality, clean and dried raw herbs like rhizomes, seeds, pods.
- 2) Cleaning –
 - Clean the herbs to remove dust foreign particles or adulterants.
 - Wash briefly and dry completely in shade if needed.
- 3) Drying –
 - Dry any washed herbs until they are completely moisture free.
- 4) Heating –
 - Heat all the ingredients individually until they appear brown colour on low heating.
- 5) Grinding or powdering –
 - Individually grind each dried ingredients using grinder or mixture.
 - Use 80 mesh sieve to obtain a fine powder.
- 6) Weighing –
 - Weigh individual powdered ingredients according to their formulation ratio.
- 7) Mixing –
 - Mix the powder uniformly in a clean and dry stainless Steel bowl or blender.
- 8) Sieving –
 - Sieve the final blend again to ensure uniform particle size.
- 9) Packaging –
 - Pack the churna in airtight food grade containers usually amber glass or transparent plastic container to protect from moisture and light.
- 10) Labelling –
 - Label the container with name, ingredients, weight, date of manufacturing and expiry.
- 11) Storage –
 - Store in cool, dry place away from sunlight.



(Fig.9 –Churna)

Evaluation test –

To determine the quality and potency of herbal digestive churna powder to assess the presence of specific bioactive compounds and ensure compliance with the established standards. Here's sets of chemical test that can be conducted.

1) Organoleptic evaluation –

- Appearance- The final appearance of the herbal digestive churna is fine powder.
- Colour – Typically the brown or yellowish coloured powder is formed.
- Odour –It has the characteristics aromatic odour.
- Taste –It has pungent and bitter in taste.

2) Physicochemical parameters –

a) Moisture content– The moisture content of the powder were found that it is 4%.

b) Ash value –

• Procedure

–weigh 2gm of herbal digestive powder in the crucible.

- Ignite on the low flame until it turns black in colour.
- Cool the powder .
- And repeat the procedure again.



(Fig.10- Ash value)

• Calculation –

- Weight of empty crucible = 32.500 gm
- Weight of crucible + sample = 35.500 gm
- Weight of crucible + ash (After ignition) = 32.765 gm.

• Formula –

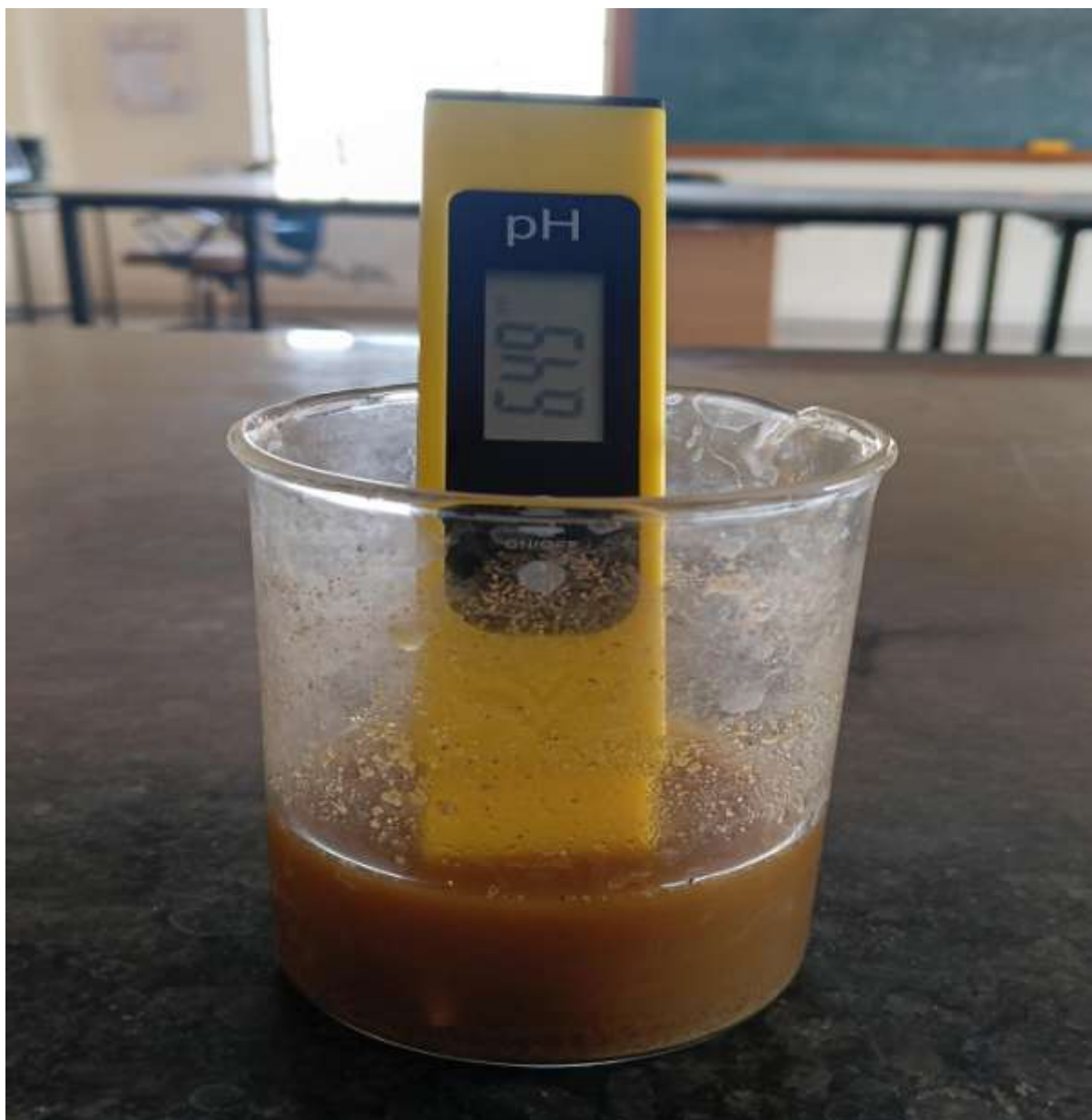
$$\begin{aligned} \text{Total ash (\%)} &= (\text{weight of ash} / \text{weight of sample}) \times 100 \\ &= (0.265 / 3.000) \times 100 \\ &= 8.83\% \end{aligned}$$

• Result –

Total ash value of herbal digestive churna is 8.83%.

c) PH-

The PH of the herbal digestive churna was found to be 6.49



(Fig.11 –PH detection)

d) Water soluble Extractive value–

• procedure –

- Weigh the sample
- Macerate
- Filter
- Evaporate
- Calculation –
- Weight of sample –5.00 gm
- Residue from 25 ml –0.112 gm

• Formula –

$$\begin{aligned}\text{Extractive value} &= (\text{weight of residue} / \text{weight of sample}) \times 100 \\ &= (0.112 \times 400) / 5.000 \\ &= 8.96 \%\end{aligned}$$

• Result –Water soluble extractive value of herbal digestive churna was found to be 8.96%w/w

3) Powder flow properties –

I)Angle of repose–

- Allow the churna to flow through a funnel to form a cone shaped pile on flat surface.
- Measure the height (h) and radius (r) of cone.
- Calculation –
 - Height = 6 cm
 - Radius = 8 cm
 - $\tan^{-1}(6/8) = 36.87^\circ$

(Fig.12– angle of repose)



- ii) Bulk density –
 - Weigh 50g of churna.
 - Pour into 100 ml cylinder without tapping.
 - Note initial volume (V1)

- Formula –

Bulk density= weight of powder (w) / Bulk volume (V1)

- Calculation –

W = 50 gm V1 = 100 ml

Bulk density = 50 / 100

= 0.5 g/ml

- Result –

The bulk density of herbal digestive churna was found to be 0.5 g/ml.

iii) Tapped density –

- Tap the cylinder of 50 gm powder upto 100 times until no further volume changes.
- Note the final volume.(V2)

- Formula –

Tapped density= weight of powder / Tapped volume

= 50/80

= 0.625 g/ml

iv) Hausners ratio–

- It is the ratio of the tapped density to the bulk density.
Hausners ratio= Tapped density/ bulk density
= 0.625/0.50
= 1.25
- Result – result shows that it has the good flow properties.

RESULT

The recent study of evaluation and formulation of the herbal digestive churna using natural ingredients known to their digestive properties. According to their efficacy to promote digestion the various herbal ingredients were selected based on their traditional and scientific use. The final products was completed the comprehensive evaluation including physicochemical analysis, Organoleptic properties and stability testing to ensure its safety, quality and shelf life .

This results indicates that the formulated herbal digestive powder passes the desirable characteristics and showed high potential as natural digestive aid.

CONCLUSION

The tested herbal digestive churna meets the quality standards set by Ayurvedic and general medicine guidelines.

The ash value test results are also within safe limits. This means powder doesn't have too much unwanted material. The extractive value show that it contains enough useful active ingredient needed for it to work well as medicine .

The way powder flows based on the tests like bulk density, angle of repose and tapped density is also good . This means it is easy to handle , pack and store . The look ,smell and taste of powder are as expected for a proper digestive herbal products. Moreover the PH measurement ensure that herbal digestive powder are formulated within an optimal PH range , associated with solubility, stability and bioavailability in the gastrointestinal tract. By integrating modern analytical tools with traditional knowledge we can continue to advance the accuracy and effectiveness of herbal medicine in supporting to digestive health.

Overall, the chemical testing helps the people to trust that the herbal digestive powder are safe for use and good for their health.